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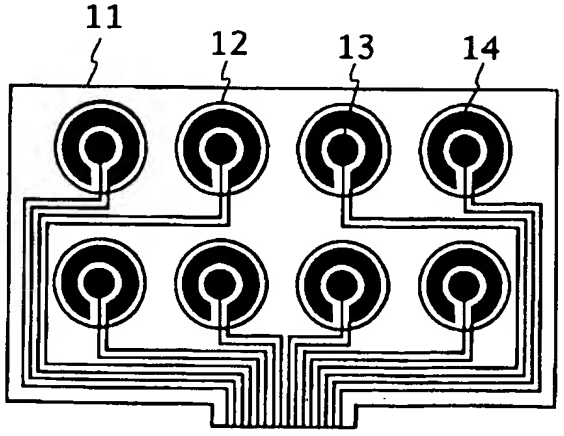
(54)【発明の名称】　電気化学測定装置

(57)【要約】

【課題】　複数試料の電気化学測定を迅速に行うための電気化学測定装置を提供する。

【解決手段】　基板１１上に複数の穴１２を有し、その各穴１２の内面に作用電極１３および対極１４を有することを特徴とする。



【特許請求の範囲】

【請求項１】 基板上に複数の穴を有し、その各穴の内面に作用電極および対極を有することを特徴とする電気化学測定装置。

【請求項２】 前記作用電極、対極以外の基板表面に絶縁膜を有する請求項１に記載の電気化学測定装置。

【請求項３】 前記作用電極および対極が線状電極であり、前記基板が透明基板である請求項１に記載の電気化学測定装置。

【請求項４】 前記作用電極および対極が透明電極であり、前記基板が透明基板である請求項１に記載の電気化学測定装置。

【請求項５】 前記作用電極が半導体電極である請求項１に記載の電気化学測定装置。

【請求項６】 基板上に複数の穴を有し、その各穴の内面に作用電極、対極および参照電極を有することを特徴とする電気化学測定装置。

【請求項７】 前記作用電極、対極、参照電極以外の基板表面に絶縁膜を有する請求項６に記載の電気化学測定装置。

【請求項８】 前記作用電極、対極および参照電極が線状電極であり、前記基板が透明基板である請求項６に記載の電気化学測定装置。

【請求項９】 前記作用電極、対極が透明電極であり、前記参照電極が線状電極であり、前記基板が透明基板である請求項６に記載の電気化学測定装置。

【請求項１０】 前記作用電極が半導体電極である請求項６に記載の電気化学測定装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は電気化学測定装置に関し、特に多数試料の同時計測装置に関するものである。

【０００２】

【従来の技術】従来の電気化学測定装置について、１９８４年、電気化学測定法を参照して以下に説明する。電気化学測定装置の第１の装置は１液系測定装置である。図７に示すように、作用電極１１、対極１４、参照電極２１の３種類の電極を１つの溶液中に挿入して計測する。作用電極１１は目的とする電気化学反応を観察するための電極であり、白金、金、カーボン、水銀等がよく電極材料として用いられる。パラジウム、オスミウム、イリジウムなどの貴金属やニッケル、鉄、鉛、亜鉛、銅等も作用電極１１として働く。更に、ガラス板上に酸化インジウムや酸化スズを蒸着した透明電極、あるいはシリコン、硫化カドミウム、酸化チタン等の半導体も作用電極１１として利用される。対極１４は、作用電極１１上での電子授受反応を円滑に進行させるための逆反応を行う電極であり、白金やカーボンが一般的に用いられる。作用電極１１、対極１４は円柱、板、線、ホイル、円板等、形状や大きさは様々である。参照電極２１は作用電極１１に設定する電位の基準を提供し、水素電極、飽和甘汞電極、銀・塩化銀電極がしばしば用いられる。参照電極電位に対して作用電極１１に電位を印加し、電流－電位曲線等の電気化学測定を行う。

【０００３】電気化学測定装置の第２の装置は２液系測定装置である。図８に示すように、作用電極１１、参照電極２１と対極１４との間が、イオン交換膜やガラスフィルター等の隔膜８１で隔離されている。作用電極１１、対極１４上での電気化学反応生成物の混在を防止するのに有効な装置である。

【０００４】電気化学測定装置の第３の装置はポーラログラフである。図９に示すように、滴下水銀電極９１を作用電極として用いる。水銀を滴下しながら電気掃引を行うため、常に清浄な電極表面が供給される。更に水銀は大きな水素過電圧を有しているため、他の金属電極では還元しにくい化学物質の電気化学還元特性を得ることができる。ポーラログラフは微量金属分析や電極還元反応機構の解析等に有力な測定装置である。

【０００５】電気化学測定装置の第４の装置は回転ディスク電極測定装置である。図１０に示すように、作用電極として白金、金、カーボン等の回転ディスク電極１０１を用いる。ディスク電極１０１を偏心のないように溶液中で回転すると、ディスク電極１０１表面上に層流状態の溶液流が生じる。ディスク電極１０１の回転数によって電極表面への対流による物質輸送を制御することができる。回転ディスク電極１０１を用いて電流－電位曲線を測定することによって、電極反応電子数や化学物質の拡散係数など電気化学反応機構の厳密な解析が可能である。

【０００６】電気化学測定装置の第５の装置は半導体電極測定装置である。図１１に示すように、作用電極としてシリコン、ガリウムヒ素、インジウムリン、ガリウムリン、硫化カドミウム、酸化チタン、酸化亜鉛、シリコンカーバイト等の半導体電極１１１を用いる。電解溶液中で半導体電極１１１表面に照射窓１１２より光照射しながら電圧を印加すると、光電流が得られる。半導体電極測定装置は光エネルギーを電気化学エネルギーへと変換する。

【０００７】また特開平３－２６２９５４には、固体高分子電解物質から成る基盤に複数の被検知ガス電極を配設し、被検知ガスマニホールド内をガスが曲折して流れるようにした、ガス検知の信頼性の高い電気化学素子が開示されている。

【０００８】

【発明が解決しようとする課題】従来の電気化学測定装置では、複数試料を計測するためには複数の電気化学測定装置を用意して同時測定するか、１つの電気化学測定装置によって試料を交換して多数回測定を繰り返さなければならない。複数の電気化学測定装置には費用、場所

が、多数回測定には時間が必要になるという問題点がある。

【０００９】本発明は、上記問題点を解決し、複数試料の電気化学測定を迅速に行うための装置を提供することを目的とする。

【００１０】

【課題を解決するための手段】前記の目的は以下の手段によって達成される。

【００１１】すなわち、本発明は、基盤上に複数の穴を有し、その各穴の内面に作用電極および対極を有することを特徴とする電気化学測定装置を提案するものであり、前記作用電極、対極以外の基板表面に絶縁膜を有すること、前記作用電極および対極が線状電極であり、前記基板が透明基板であること、前記作用電極および対極が透明電極であり、前記基板が透明基板であること、前記作用電極が半導体電極であることを含む。

【００１２】また本発明は基板上に複数の穴を有し、その各穴の内面に作用電極、対極および参照電極を有することを特徴とする電気化学測定装置を提案するものであり、前記作用電極、対極、参照電極以外の基板表面に絶縁膜を有すること、前記作用電極、対極および参照電極が線状電極であり、前記基板が透明基板であること、前記作用電極、対極が透明電極であり、前記参照電極が線状電極であり、前記基板が透明基板であること、前記作用電極が半導体電極であることを含む。

【００１３】

【発明の実施の形態】本発明の実施の形態について図面を参照して説明する。

【００１４】図１は本発明による電気化学測定装置の平面図である。

【００１５】基板１１表面上に複数の穴１２が設けられ、各々の穴１２内面に作用電極１３と対極１４が形成されている。個々の穴１２内へ測定溶液を注入し、作用電極１３と対極１４によって、複数試料の電気化学計測を同時に行う。

【００１６】

【実施例】本発明の実施例について図面を参照して説明する。

［第１の実施例］図１を参照して、本発明の電気化学測定装置の第１の実施例について説明する。

【００１７】基板１１表面上には８つの半球状の穴１２が形成されている。各々の穴１２は、その内面に金、白金、カーボン等の円形作用電極１３と帯状対極１４を有している。８つの作用電極１３と対極１４からのリード線は一箇所に集められている。８つの穴１２内へ測定溶液を導入し、８つの作用電極１３と対極１４を使って、８つの試料の電気化学測定を同時に行うことができる。

［第２の実施例］図２を参照して、本発明の電気化学測定装置の第２の実施例について説明する。

【００１８】第１の実施例と同様に、基板１１表面上には８つの半球状の穴１２が形成されている。各々の穴１２は、その内面に金、白金、カーボン等の帯状作用電極１３、対極１４と銀・塩化銀の円形参照電極２１を有している。８つの作用電極１３、対極１４、参照電極２１からのリード線は一箇所に集められている。８つの穴１２内へ測定溶液を導入し、８つの作用電極１３、対極１４、参照電極２１を使って、８つの試料の電気化学測定を同時に行うことができる。更に、参照電極２１を有しているため、作用電極１３および対極１４表面上の電気化学反応を個別に解析することができる。

［第３の実施例］図３を参照して、本発明の電気化学測定装置の第３の実施例について説明する。

【００１９】第２の実施例と同様に、基板１１表面上には８つの半球状の穴１２が形成されている。各々の穴１２は、その内面に金、白金、カーボン等の帯状作用電極１３、対極１４と銀・塩化銀の円形参照電極２１を有している。更に、作用電極１３、対極１４、参照電極２１以外の基板表面には窒化シリコンや酸化タンタル等の絶縁膜３１が形成されている。この絶縁膜３１によって作用電極１３、対極１４、参照電極２１の電極面積が規定され、より厳密な電気化学測定を行うことができる。

［第４の実施例］図４を参照して、本発明の電気化学測定装置の第４の実施例について説明する。

【００２０】基板１１としてプラスチック、ガラス、石英等の透明基板を用いる。基板１１表面上には８つの半球状の穴１２が形成されている。各々の穴１２は、その内面に金、白金、カーボン等の線状作用電極１３、対極１４と銀・塩化銀の線状参照電極２１を有している。８つの作用電極１３、対極１４、参照電極２１からのリード線は一箇所に集められている。８つの穴１２内へ測定溶液を導入し、８つの作用電極１３、対極１４、参照電極２１を使って、８つの試料の電気化学測定を同時に行うことができる。更に透明基板と線状電極を用いているため、穴１２内へ光を導入することにより、溶液の電気化学測定を行いながら分光計測も同時に行うことができる。

［第５の実施例］図５を参照して、本発明の電気化学測定装置の第５の実施例について説明する。

【００２１】第４の実施例と同様に、基板１１としてプラスチック、ガラス、石英等の透明基板を用いる。基板１１表面上には８つの半球状の穴１２が形成されている。各々の穴１２は、その内面に酸化インジウムや酸化スズ等の透明、帯状作用電極１３、対極１４と銀・塩化銀の線状参照電極２１を有している。第４の実施例と同じく、透明基板、透明電極、線状電極を用いているため、穴１２内に光を導入することにより、溶液の電気化学測定を行いながら分光計測も同時に行うことができる。

［第６の実施例］図６を参照して、本発明の電気化学測定装置の第６の実施例について説明する。

【００２２】第１の実施例と同様に、基板１１表面上には８つの半球状の穴１２が形成されている。各々の穴１２は、その内面にシリコン、硫化カドミウム、酸化チタン等の半導体、帯状作用電極１３、金、白金、カーボン等の帯状電極１４と銀・塩化銀の円形参照電極２１を有している。８つの穴１２内へ測定溶液を導入し、光を照射することによって、８つの作用電極１３、対極１４、参照電極２１を使って、８つの試料の光電気化学測定を同時に行うことができる。

【００２３】以上、第１～第６の実施例に示したように、基板１１表面上に複数の穴１２を形成し、穴１２内面に作用電極１３、対極１４あるいは参照電極２１を作製する。各々の穴１２内へ測定溶液を導入することによって、複数試料の電気化学測定を迅速に行うことができる。

【００２４】基板１１、作用電極１３、対極１４、参照電極２１、絶縁膜３１の材料に制限はない。また、穴１２、作用電極１３、対極１４、参照電極２１の数や形状にも決まりはない。

【００２５】

【発明の効果】以上説明したように、本発明による電気化学測定装置は、基板上に複数の穴を有し、その各穴内面に作用電極、対極あるいは作用電極、対極および参照電極具備している。従って、本発明によれば、複数の測定溶液を複数の穴内へ注入し、複数の電極によって、複数試料の迅速な電気化学測定が可能になる。

【００２６】さらに、透明基板を使い、作用電極および対極として線状電極あるいは透明電極を用いれば、複数試料の迅速な電気化学測定と分光計測を同時に行うことができる。また、作用電極として半導体電極を用いれば、複数試料の迅速な光電気化学測定を行うことができる。

【図面の簡単な説明】

【図１】本発明による電気化学測定装置の第１の実施例の平面図である。

【図２】本発明による電気化学測定装置の第２の実施例の平面図である。

【図３】本発明による電気化学測定装置の第３の実施例の平面図である。

【図４】本発明による電気化学測定装置の第４の実施例の平面図である。

【図５】本発明による電気化学測定装置の第５の実施例の平面図である。

【図６】本発明による電気化学測定装置の第６の実施例の平面図である。

【図７】従来の電気化学測定装置、第１の装置を説明するための模式構成図である。

【図８】従来の電気化学測定装置、第２の装置を説明するための模式構成図である。

【図９】従来の電気化学測定装置、第３の装置を説明するための模式構成図である。

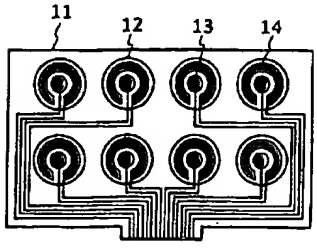
【図１０】従来の電気化学測定装置、第４の装置を説明するための模式構成図である。

【図１１】従来の電気化学測定装置、第５の装置を説明するための模式構成図である。

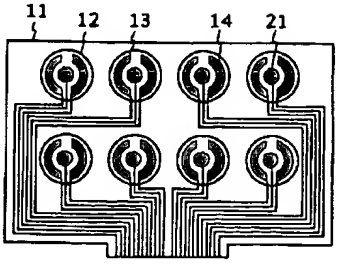
【符号の説明】

１１　基板
１２　穴
１３　作用電極
１４　対極
２１　参照電極
３１　絶縁膜
８１　隔膜
９１　滴下水銀電極
１０１　回転ディスク電極
１１１　半導体電極
１１２　照射窓

【図１】



【図２】



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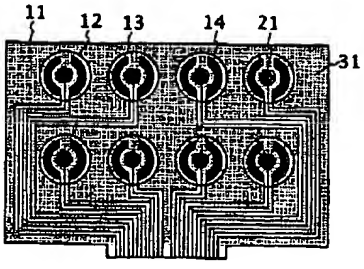

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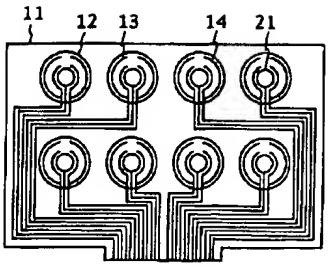

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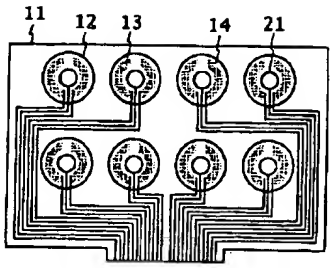

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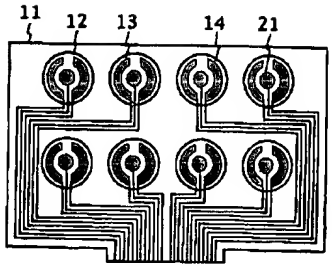

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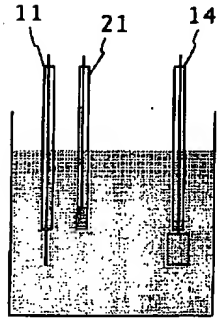

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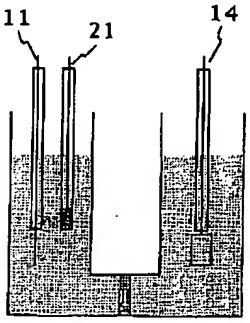

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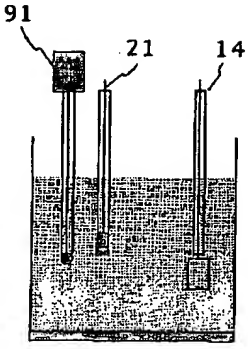

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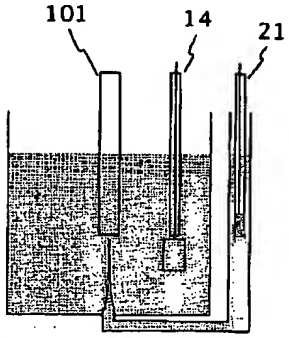

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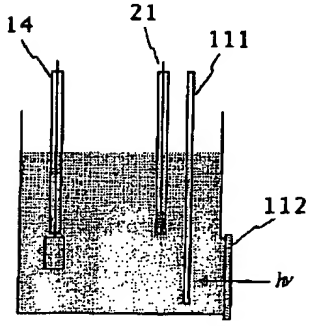

PATENT ABSTRACTS OF JAPAN

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(43)Date of publication of application : 08.12.1998

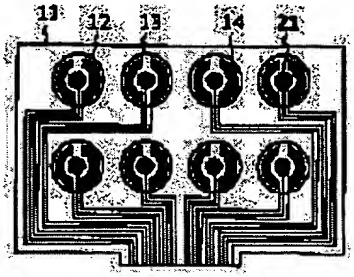
(51)Int.Cl. G01N 27/27
G01N 27/403

(21)Application number : 09-135345
(22)Date of filing : 26.05.1997

(71)Applicant : NEC CORP
(72)Inventor : MURAKAMI TORU

(54) ELECTROCHEMICAL MEASURING APPARATUS

(57)Abstract:
PROBLEM TO BE SOLVED: To quickly measure a plurality of samples electrochemically, by forming a plurality of holes on a substrate and setting an acting electrode and a counterpart electrode at an inner face of each hole.



SOLUTION: For instance, eight hemispherical holes 12 are formed on a surface of a substrate 11. A circular acting electrode 13 of gold, platinum, carbon or the like and a band-shaped opposite electrode 14 are set at an inner face of each hole 12. Lead wires from the electrodes are collected at one point. A measuring solution is introduced into the eight holes 12, whereby eight samples can be measured electrochemically at the same time with the use of the eight acting electrodes 13 and opposite electrodes 14. When a circular reference electrode 12 of silver or silver chloride is set, an electrochemical reaction on the surface between the acting electrode 13 and opposite electrode 14 can be analyzed individually. A transparent substrate of plastic, glass, quartz or the like is used as the substrate 11, and the acting electrode 13 and opposit electrode 14 are formed of a transparent material such as indium oxide, tin (IV) oxide, etc. If light is brought into the hole 12, spectrophotometry for the solution is enabled simultaneously with the electrochemical measurement.

LEGAL STATUS

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[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]
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[Pat nt numb r]
[Date of registration]
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of rejection]
[Date of requesting appeal against examiner's decision of rejecti n]
[Date of extinction of right]

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CLAIMS

[Claim(s)]
[Claim 1] The electrochemistry measuring device characterized by having two or more holes on a substrate, and having a working electrode and a counter electrode in the inside of each of that hole.
[Claim 2] The electrochemistry measuring device according to claim 1 which has an insulator layer on substrate front faces other than the aforementioned working electrode and a counter electrode.
[Claim 3] the aforementioned working electrode and a counter electrode -- a line -- the electrochemistry measuring device according to claim 1 whose aforementioned substrate it is an electrode and is a transparent substrate
[Claim 4] The electrochemistry measuring device according to claim 1 whose aforementioned substrate the aforementioned working electrode and a counter electrode are transparent electrodes, and is a transparent substrate.
[Claim 5] The electrochemistry measuring device according to claim 1 whose aforementioned working electrode is a semiconductor electrode.
[Claim 6] The electrochemistry measuring device characterized by having two or more holes on a substrate, and having a working electrode, a counter electrode, and a reference electrode in the inside of each of that hole.
[Claim 7] The electrochemistry measuring device according to claim 6 which has an insulator layer on substrate front faces other than the aforementioned working electrode, a counter electrode, and a reference electrode.
[Claim 8] the aforementioned working electrode, a counter electrode, and a reference electrode -- a line -- the electrochemistry measuring device according to claim 6 whose aforementioned substrate it is an electrode and is a transparent substrate
[Claim 9] the aforementioned working electrode and a counter electrode -- a transparent electrode -- it is -- the aforementioned reference electrode -- a line -- the electrochemistry measuring device according to claim 6 whose aforementioned substrate it is an electrode and is a transparent substrate
[Claim 10] The electrochemistry measuring device according to claim 6 whose aforementioned working electrode is a semiconductor electrode.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] Many especially this inventions relate to the simultaneous metering device of a sample about an electrochemistry measuring device.
[0002]
[Description of the Prior Art] The conventional electrochemistry measuring device will be explained below with reference to an electrochemistry measuring method in 1984. The 1st equipment of an electrochemistry measuring device is 1 liquid system measuring device. As shown in drawing 7 , three kinds of electrodes, a working electrode 11, a counter electrode 14, and a reference electrode 21, are inserted into one solution, and are measured. A working electrode 11 is an electrode for observing the target electrochemical reaction, and platinum, gold, carbon, mercury, etc. are well used as an electrode material. Noble metals and nickel, such as palladium, an osmium, and iridium, iron, lead, zinc, copper, etc. work as a working electrode 11. Furthermore, semiconductors, such as a transparent electrode which deposited indium oxide and the tin oxide on the glass plate or silicon, a cadmium sulfide, and titanium oxide, are also used as a working electrode 11. A counter electrode 14 is an electrode which performs reverse reaction for advancing smoothly the electronic transfer reaction on a working electrode 11, and, generally platinum and carbon are used. A pillar, a board, a line, the foil, the disk of a configuration or a size, etc. are [a working electrode 11 and a counter electrode 14] various. A reference electrode 21 offers the criteria of the potential set as a working electrode 11, and a hydrogen electrode, a saturated calomel electrode, and a silver-silver chloride electrode are often used. Potential is impressed to a working electrode 11 to reference-electrode potential, and electrochemistry measurement of a current potential curve etc. is performed.
[0003] The 2nd equipment of an electrochemistry measuring device is 2 liquid system measuring device. As shown in drawing 8 , between a working electrode 11, a reference electrode 21, and counter electrodes 14 is isolated by the diaphragms 81, such as ion exchange membrane and a glass filter. It is equipment effective in preventing mixture of the electrochemical reaction product on a working electrode 11 and a counter electrode 14.
[0004] The 3rd equipment of an electrochemistry measuring device is a polarograph. As shown in drawing 9 , a dropping mercury electrode 91 is used as a working electrode. While mercury is dropped, in order to perform an electric sweep, an always pure electrode front face is supplied. Furthermore, since mercury has the big hydrogen overvoltage, it can acquire the electrochemistry reduction property of the chemical which is hard to return in other metal electrodes. A polarograph is a leading measuring device for trace element analysis, the analysis of an electrode reduction reaction mechanism, etc.
[0005] The 4th equipment of an electrochemistry measuring device is a rotation disk electrode measuring device. As shown in drawing 10 , the rotation disk electrodes 101, such as platinum, gold, and carbon, are used as a working electrode. If the disk electrode 101 is rotated in a solution so that there may be no eccentricity, the solution style of a laminar-flow state will arise on disk electrode 101 front face. The matter transportation by the convection current on the front face of an electrode is controllable by the rotational frequency of the disk electrode 101.

By measuring a current potential curve using the rotation disk electrode 101, the strict analysis of electrochemical reaction mechanisms, such as an electrode reaction electron number and a diffusion coefficient of a chemical, is possible.

[0006] The 5th equipment of an electrochemistry measuring device is a semiconductor-electrode measuring device. As shown in drawing 11 , the semiconductor electrodes 111, such as silicon, a gallium arsenide, indium phosphorus, gallium phosphorus, a cadmium sulfide, titanium oxide, a zinc oxide, and silicon carbide, are used as a working electrode. A photocurrent will be acquired if voltage is impressed carrying out optical irradiation from the irradiation aperture 112 on semiconductor-electrode 111 front face in an electrolyte. A semiconductor-electrode measuring device transforms a light energy into electrochemistry energy.

[0007] Moreover, the reliable electrochemistry element of gas detection arrange two or more detected gas electrodes in the base which consists of the quality of a solid-state macromolecule electrolyte, gas bends the inside of a detected gas manifold, and it was made to flow is indicated by JP,3-262954,A.

[0008]

[Problem(s) to be Solved by the Invention] In the conventional electrochemistry measuring device, in order to measure two or more samples, two or more electrochemistry measuring devices must be prepared and measured simultaneously, or samples must be exchanged by one electrochemistry measuring device, and measurement must be repeated many times. There is a trouble that costs and a place are needed for two or more electrochemistry measuring devices, and time is needed for measurement many times.

[0009] this invention solves the above-mentioned trouble and aims at offering the equipment for performing electrochemistry measurement of two or more samples quickly.

[0010]

[Means for Solving the Problem] The aforementioned purpose is attained by the following meanses.

[0011] namely, proposing the electrochemistry measuring device characterized by for this invention to have two or more holes on a base, and to have a working electrode and a counter electrode in the inside of each of that hole, and having an insulator layer on substrate front faces other than the aforementioned working electrode and a counter electrode, the aforementioned working electrode, and a counter electrode -- a line -- that it is an electrode and the aforementioned substrate is a transparent substrate, the aforementioned working electrode, and a counter electrode are transparent electrodes, and it includes that the aforementioned substrate is a transparent substrate and that the

[0012] this invention has two or more holes on a substrate to the inside of each of that hol Moreover, a working electrode, The electrochemistry measuring device characterized by having a counter electrode and a reference electrode is proposed, and it has an insulator layer on substrate front faces other than the aforementioned working electrode, a counter electrode, and a reference electrode, the aforementioned working electrode, a counter electrode, and a reference electrode -- a line -- that it is an electrode and the aforementioned substrate is a transparent substrate, the aforementioned working electrode, and a counter electrode -- a transparent electrode -- it is -- the aforementioned reference electrode -- a line -- it includes that it is an electrode and the aforementioned substrate is a transparent substrate and that the aforementioned working electrode is a semiconductor electrode

[0013]

[Embodiments of the Invention] The gestalt of operation of this invention is explained with reference to a drawing.

[0014] Drawing 1 is the plan of the electrochemistry measuring device by this invention.

[0015] Two or more holes 12 are formed on substrate 11 front face, and the working electrode 13 and the counter electrode 14 are formed in each hole 12 inside. A measurement solution is poured in into each hole 12, and a working electrode 13 and a count r electrode 14 perform electrochemistry measurement of two or more samples simultaneously.

[0016]

[Example] The example of this invention is explained with reference to a drawing.

With reference to [1st example] drawing 1 , the 1st example of the electrochemistry measuring device of this invention is explained.
[0017] On the substrate 11 front face, the hole 12 of the shape of eight semi-sphere is formed. Each hole 12 has the circular working electrode 13 and the band-like counter electrodes 14, such as gold, platinum, and carbon, in the inside. The lead wire from eight working electrodes 13 and counter electrodes 14 is brought together in one place. A measurement solution can be introduced into eight holes 12, and electrochemistry measurement of eight samples can be simultaneously performed using eight working electrodes 13 and counter electrodes 14.
With reference to [2nd example] drawing 2 , the 2nd example of the electrochemistry measuring device of this invention is explained.
[0018] On the substrate 11 front face, the hole 12 of the shape of eight semi-sphere is formed like the 1st example. Each hole 12 has the band-like working electrodes 13, such as gold, platinum, and carbon, the counter electrode 14, and the circular reference electrode 21 of silver salt-ized silver in the inside. The lead wire from eight working electrodes 13, a counter electrode 14, and a reference electrode 21 is brought together in one place. A measurement solution can be introduced into eight holes 12, and electrochemistry measurement of eight samples can be simultaneously performed using eight working electrodes 13, a counter electrode 14, and a reference electrode 21. Furthermore, since it has the reference electrode 21, the electrochemical reaction on a working electrode 13 and counter electrode 14 front face is individually analyzable.
With reference to [3rd example] drawing 3 , the 3rd example of the electrochemistry measuring device of this invention is explained.
[0019] On the substrate 11 front face, the hole 12 of the shape of eight semi-sphere is formed like the 2nd example. Each hole 12 has the band-like working electrodes 13, such as gold, platinum, and carbon, the counter electrode 14, and the circular reference electrode 21 of silver salt-ized silver in the inside. Furthermore, the insulator layers 31, such as a silicon nitride and tantalum oxide, are formed in substrate front faces other than working-electrode 13, counter electrode 14, and reference-electrode 21. By this insulator layer 31, the electrode area of a working electrode 13, a counter electrode 14, and a reference electrode 21 is specified, and stricter electrochemistry measurement can be performed.
With reference to [4th example] drawing 4 , the 4th example of the electrochemistry measuring device of this invention is explained.
[0020] Transparent substrates, such as plastics, glass, and a quartz, are used as a substrate 11. On the substrate 11 front face, the hole 12 of the shape of eight semi-sphere is formed. each hole 12 -- the inside -- lines, such as gold, platinum, and carbon, -- the line of a working electrode 13, a counter electrode 14, and silver salt-ized silver -- it has the reference electrode 21 The lead wire from eight working electrodes 13, a counter electrode 14, and a reference electrode 21 is brought together in one place. A measurement solution can be introduced into eight holes 12, and electrochemistry measurement of eight samples can be simultaneously performed using eight working electrodes 13, a counter electrode 14, and a reference electrode 21. furthermore, a transparent substrate and a line -- since the electrode is used, while performing electrochemistry measurement of a solution by introducing light into a hole 12 -- a spectrum -- measurement can also be performed simultaneously
With reference to [5th example] drawing 5 , the 5th example of the electrochemistry measuring device of this invention is explained.
[0021] Transparent substrates, such as plastics, glass, and a quartz, are used as a substrate 11 like the 4th example. On the substrate 11 front face, the hole 12 of the shape of eight semi-sphere is formed. each hole 12 -- the inside -- the line of transparence, such as indium oxid and tin oxide, the band-like working electrode 13, a counter electrode 14, and silver salt-ized silver -- it has the reference electrod 21 the 4th exampl -- the same -- a transparent substrate, a transparent electrode, and a line -- since the electrode is used, while performing electrochemistry measurement of a solution by introducing light in a hole 12 -- a spectrum -- measurement can also be p rformed simultaneously
With reference to [6th example] drawing 6 , the 6th example of the electrochemistry measuring

device of this invention is explained.
[0022] On the substrate 11 front face, the hole 12 of the shape of eight semi-sphere is formed like the 1st example. Each hole 12 has the band electrodes 14, such as semiconductors, such as silicon, a cadmium sulfide, and titanium oxide, the band-like working electrode 13, gold, platinum, and carbon, and the circular reference electrode 21 of silver salt-ized silver in the inside. Photoelectrical evaporation study measurement of eight samples can be simultaneously performed by introducing a measurement solution into eight holes 12, and irradiating light using eight working electrodes 13, a counter electrode 14, and a reference electrode 21.
[0023] As mentioned above, as shown in the 1st - the 6th example, two or more holes 12 are formed on substrate 11 front face, and a working electrode 13, a counter electrode 14, or a reference electrode 21 is produced to hole 12 inside. By introducing a measurement solution into each hole 12, electrochemistry measurement of two or more samples can be performed quickly.
[0024] There is no limit in the material of a substrate 11, a working electrode 13, a counter electrode 14, a reference electrode 21, and an insulator layer 31. Moreover, there is no rule also in the number and configuration of a hole 12, a working electrode 13, a counter electrode 14, and a reference electrode 21.
[0025]
[Effect of the Invention] the hole of plurality [measuring device / electrochemistry / according to this invention as explained above / top / substrate] -- having -- each of that hole inside -- a working electrode, a counter electrode or a working electrode, and a counter electrode -- and reference-electrode possession is carried-out-Therefore, according to this invention, two or more measurement solutions are poured in into two or more holes, and quick electrochemistry measurement of two or more samples is attained by two or more electrodes.
[0026] furthermore, a transparent substrate -- using -- as a working electrode and a counter electrode -- a line -- if an electrode or a transparent electrode is used -- quick electrochemistry measurement and the spectrum of two or more samples -- it is simultaneously measurable Moreover, if a semiconductor electrode is used as a working electrode, quick photoelectrical evaporation study measurement of two or more samples can be performed.

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TECHNICAL FIELD

[The technical field to which invention belongs] Many especially this inventions relate to the simultaneous metering device of a sample about an electrochemistry measuring device.

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PRIOR ART

[Description of the Prior Art] The conventional electrochemistry measuring device will be explained below with reference to an electrochemistry measuring method in 1984. The 1st equipment of an electrochemistry measuring device is 1 liquid system measuring device. As shown in drawing 7 , three kinds of electrodes, a working electrode 11, a counter electrode 14, and a reference electrode 21, are inserted into one solution, and are measured. A working electrode 11 is an electrode for observing the target electrochemical reaction, and platinum, gold, carbon, mercury, etc. are well used as an electrode material. Noble metals and nickel, such as palladium, an osmium, and iridium, iron, lead, zinc, copper, etc. work as a working electrode 11. Furthermore, semiconductors, such as a transparent electrode which deposited indium oxide and the tin oxide on the glass plate or silicon, a cadmium sulfide, and titanium oxide, are also used as a working electrode 11. A counter electrode 14 is an electrode which performs reverse reaction for advancing smoothly the electronic transfer reaction on a working electrode 11, and, generally platinum and carbon are used. A pillar, a board, a line, the foil, the disk of a configuration or a size, etc. are [a working electrode 11 and a counter electrode 14] various. A reference electrode 21 offers the criteria of the potential set as a working electrode 11, and a hydrogen electrode, a saturated calomel electrode, and a silver-silver chloride electrode are often used. Potential is impressed to a working electrode 11 to reference-electrode potential, and electrochemistry measurement of a current potential curve etc. is performed.
[0003] The 2nd equipment of an electrochemistry measuring device is 2 liquid system measuring device. As shown in drawing 8 , between a working electrode 11, a reference electrode 21, and counter electrodes 14 is isolated by the diaphragms 81, such as ion exchange membrane and a glass filter. It is equipment effective in preventing mixture of the electrochemical reaction product on a working electrode 11 and a counter electrode 14.
[0004] The 3rd equipment of an electrochemistry measuring device is a polarograph. As shown in drawing 9 , a dropping mercury electrode 91 is used as a working electrode. While mercury is dropped, in order to perform an electric sweep, an always pure electrode front face is supplied. Furthermore, since mercury has the big hydrogen overvoltage, it can acquire the electrochemistry reduction property of the chemical which is hard to return in other metal electrodes. A polarograph is a leading measuring device for trace element analysis, the analysis of an electrode reduction reaction mechanism, etc.
[0005] The 4th equipment of an electrochemistry measuring device is a rotation disk electrode measuring device. As shown in drawing 10 , the rotation disk electrodes 101, such as platinum, gold, and carbon, are used as a working electrode. If the disk electrode 101 is rotated in a solution so that there may be no eccentricity, the solution style of a laminar-flow state will arise on disk electrode 101 front face. The matter transportation by the convection current on the front face of an electrode is controllable by the rotational frequency of the disk electrode 101. By measuring a current potential curve using the rotation disk electrode 101, the strict analysis of electrochemical reaction mechanisms, such as an electrode reaction electron number and a diffusion coefficient of a chemical, is possible.
[0006] The 5th equipment of an electrochemistry measuring device is a semiconductor-electrode measuring device. As shown in drawing 11 , the semiconductor electrodes 111, such as

silicon, a gallium arsenide, indium phosphorus, gallium phosphorus, a cadmium sulfide, titanium oxide, a zinc oxide, and silicon carbide, are used as a working electrode. A photocurrent will be acquired if voltage is impressed carrying out optical irradiation from the irradiation aperture 112 on semiconductor-electrode 111 front face in an electrolyte. A semiconductor-electrode measuring device transforms a light energy into electrochemistry energy.

[0007] Moreover, the reliable electrochemistry element of gas detection arrange two or more detected gas electrodes in the base which consists of the quality of a solid-state macromolecule electrolyte, gas bends the inside of a detected gas manifold, and it was made to flow is indicated by JP,3-262954,A.

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EFFECT OF THE INVENTION

[Effect of the Invention] the hole of plurality [measuring device / electrochemistry / according to this invention as explained above / top / substrate] -- having -- each of that hole inside -- a working electrode, a counter electrode or a working electrode, and a counter electrode -- and reference-electrode possession is carried out Therefore, according to this invention, two or more measurement solutions are poured in into two or more holes, and quick electrochemistry measurement of two or more samples is attained by two or more electrodes.
[0026] furthermore, a transparent substrate -- using -- as a working electrode and a counter electrode -- a line -- if an electrode or a transparent electrode is used -- quick electrochemistry measurement and the spectrum of two or more samples -- it is simultaneously measurable Moreover, if a semiconductor electrode is used as a working electrode, quick photoelectrical evaporation study measurement of two or more samples can be performed.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In the conventional electrochemistry measuring device, in order to measure two or more samples, two or more electrochemistry measuring devices must be prepared and measured simultaneously, or samples must be exchanged by one electrochemistry measuring device, and measurement must be repeated many times. There is a trouble that costs and a place are needed for two or more electrochemistry measuring devices, and time is needed for measurement many times.
[0009] this invention solves the above-mentioned trouble and aims at offering the equipment for performing electrochemistry measurement of two or more samples quickly.

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MEANS

[Means for Solving the Problem] The aforementioned purpose is attained by the following meanses.
[0011] namely, proposing the electrochemistry measuring device characterized by for this invention to have two or more holes on a base, and to have a working electrode and a counter electrode in the inside of each of that hole, and having an insulator layer on substrate front faces other than the aforementioned working electrode and a counter electrode, the aforementioned working electrode, and a counter electrode -- a line -- that it is an electrode and the aforementioned substrate is a transparent substrate, the aforementioned working electrode, and a counter electrode are transparent electrodes, and it includes that the aforementioned substrate is a transparent substrate and that the
[0012] this invention has two or more holes on a substrate. to the inside of each of that hole Moreover, a working electrode, The electrochemistry measuring device characterized by having a counter electrode and a reference electrode is proposed, and it has an insulator layer on substrate front faces other than the aforementioned working electrode, a counter electrode, and a reference electrode, the aforementioned working electrode, a counter electrode, and a reference electrode -- a line -- that it is an electrode and the aforementioned substrate is a transparent substrate, the aforementioned working electrode, and a counter electrode -- a transparent electrode -- it is -- the aforementioned reference electrode -- a line -- it includes that it is an electrode and the aforementioned substrate is a transparent substrate and that th aforementioned working electrode is a semiconductor electrode
[0013]
[Embodiments of the Invention] The gestalt of operation of this invention is explained with reference to a drawing.
[0014] Drawing 1 is the plan of the electrochemistry measuring device by this invention.
[0015] Two or more holes 12 are formed on substrate 11 front face, and the working electrode 13 and the counter electrode 14 are formed in each hole 12 inside. A measurement solution is poured in into each hole 12, and a working electrode 13 and a counter electrode 14 perform electrochemistry measurement of two or more samples simultaneously.

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EXAMPLE

[Example] The example of this invention is explained with reference to a drawing.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the plan of the 1st example of the electrochemistry measuring device by this invention.
[Drawing 2] It is the plan of the 2nd example of the electrochemistry measuring device by this invention.
[Drawing 3] It is the plan of the 3rd example of the electrochemistry measuring device by this invention.
[Drawing 4] It is the plan of the 4th example of the electrochemistry measuring device by this invention.
[Drawing 5] It is the plan of the 5th example of the electrochemistry measuring device by this invention.
[Drawing 6] It is the plan of the 6th example of the electrochemistry measuring device by this invention.
[Drawing 7] It is a ** type block diagram for explaining the conventional electrochemistry measuring device and the 1st equipment.
[Drawing 8] It is a ** type block diagram for explaining the conventional electrochemistry measuring device and the 2nd equipment.
[Drawing 9] It is a ** type block diagram for explaining the conventional electrochemistry measuring device and the 3rd equipment.
[Drawing 10] It is a ** type block diagram for explaining the conventional electrochemistry measuring device and the 4th equipment.
[Drawing 11] It is a ** type block diagram for explaining the conventional electrochemistry measuring device and the 5th equipment.
[Description of Notations]
11 Substrate
12 Hole
13 Working Electrode
14 Counter Electrode
21 Reference Electrode
31 Insulator Layer
81 Diaphragm
91 Dropping Mercury Electrode
101 Rotation Disk Electrode
111 Semiconductor Electrode
112 Irradiation Aperture

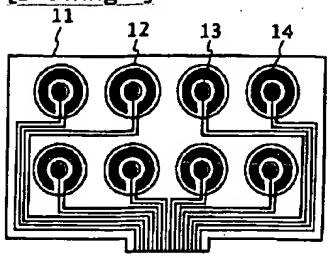
[Translation done.]

* NOTICES *

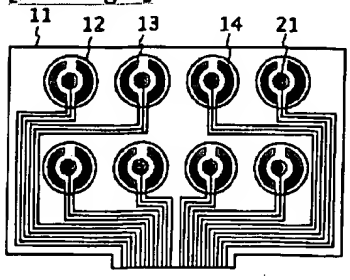
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

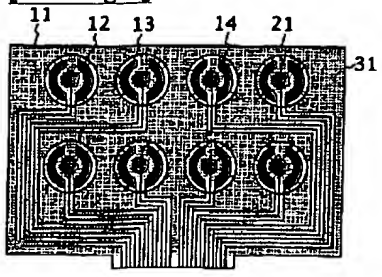
[Drawing 1]



[Drawing 2]



[Drawing 3]



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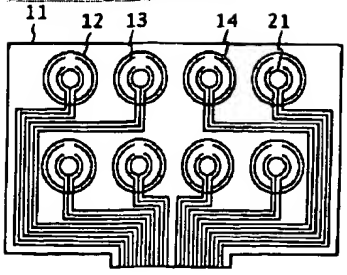
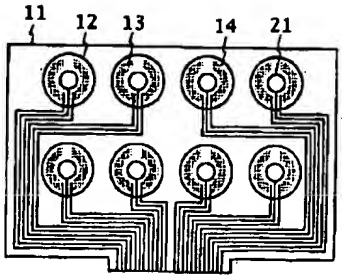


[Drawing 5]



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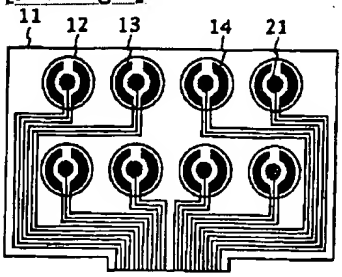
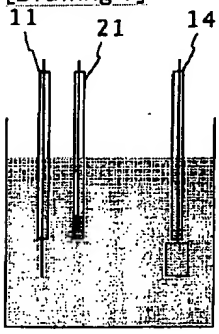
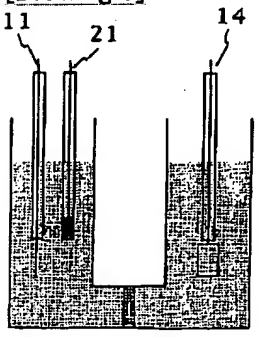


[Drawing 7]

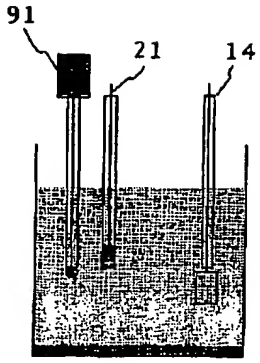


[Drawing 8]

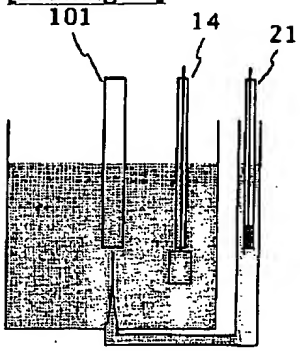


81

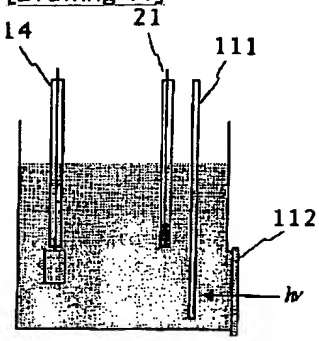
[Drawing 9]



[Drawing 10]



[Drawing 11]



[Translation done.]